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IS 3836 (2000): Fire Safety of Industrial Buildings - Jute Mills - Code of Practice [CED 36: Fire Safety]

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औद्योगिक भवनों की अग्नि से सुरक्षा — जूट मिले —  
रीति संहिता  
( दूसरा पुनरीक्षण )

*Indian Standard*

FIRE SAFETY OF INDUSTRIAL BUILDINGS — JUTE  
MILLS — CODE OF PRACTICE

( *Second Revision* )

ICS 13.220.20; 91.040.20

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BUREAU OF INDIAN STANDARDS  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

## FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Fire Safety Sectional Committee had been approved by the Civil Engineering Division Council.

Frequency of the out-breaks of fire in jute mills and jute godowns would be appreciatively minimized if predetermined safety measures are adopted in the construction of mill building, installation of machinery and in the storage godown. This safety code has, therefore, been formulated with a view to give necessary guidance regarding the security measures on fire safety precautions, which if followed would safeguard the mill from fire-hazard to a large extent. This standard was first published in 1966 and revised in 1979. This revision is based on developments in the field and comments received subsequently.

In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

## *Indian Standard*

# FIRE SAFETY OF INDUSTRIAL BUILDINGS — JUTE MILLS — CODE OF PRACTICE

*(Second Revision)*

## **1 SCOPE**

**1.1** This standard covers the essential requirements for the fire safety of jute spinning and weaving and processing mills; jute rope and carpet making factories.

**1.2** For the purpose of this standard, the term jute shall be deemed to include flax, hemp, sisal and similar vegetable fibre other than cotton or kapok.

## **2 NORMATIVE REFERENCES**

**2.1** The Indian Standards listed in Annex A contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All Standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards as given in Annex A.

## **3 TERMINOLOGY**

**3.0** For the purpose of this standard, the definitions given in IS 232 and IS 8757 and the following shall apply.

### **3.1 Batching Oil**

The mineral oil used in softening machines for softening of jute fibres.

### **3.2 Bitumen Coating and Lining Plant**

Machinery used for bitumen coating of hessian and subsequent lining of the same with paper or polythene.

### **3.3 Caddi**

Jute waste

### **3.4 Finished Goods Godown**

Godown containing hessian and gunny bags in hoop iron bound bales or broad loom cloths or both tightly packed over steel cores.

### **3.5 Jute Bales, *Kutcha***

Bales packed by hand-powered baling presses.

### **3.6 Jute Bales, *Pucca***

Bales packed by hydraulically operated baling presses.

### **3.7 Jute Godowns**

Godown containing jute fibres, baled or loose.

### **3.8 Jute Godown, Baled**

Godown containing jute bales only.

### **3.9 Jute Godown, Loose**

Godown containing either loose jute or bundles of jute which are not baled either by a hand-powered or a hydraulically operated press.

### **3.10 Jute Peel**

Stacks of jute located in the open.

### **3.11 Motor Alley**

Building housing only the electric motor drives of the mill.

### **3.12 Processing**

Buildings where any finishing operations, such as calendering, folding and baling are carried out.

### **3.13 Rope Alley**

Building housing only the power driving ropes of the mill.

### **3.14 Static Tank**

A water reservoir reserved for fire fighting purposes.

### **3.15 Utility Buildings**

Buildings required for various operational needs of the mill, namely, boiler house and pump house.

### **3.16 Waste Recovery Plant**

Plant comprising teasers and dust-shakers used for recovery of jute fibre from mill sweepings.

## **4 GENERAL**

**4.1** To reduce the frequency and serious occurrence of fire in a mill building, the premises of the building shall be provided with automatic sprinklers and proper attention shall be paid to house-keeping matters.

## **5 LOCATION**

**5.1** The mills shall be located in an industrial area as far as possible.

**5.2** When a mill is located near a railway line, the working blocks and storage areas shall be not less than 30 m away from the railway line.

**5.3** The mill shall abut on a street and width of such street shall not be less than 10 m.

**5.4** No waste shall be dumped within 30 m of the boundary of the mill.

## 6 COMPOUND

**6.1** The compound shall be sufficiently spacious to enclose the processing, manufacturing, storage and other subsidiary buildings in such a manner as to comply with the provisions of 9 of this standard.

**6.2** The compound shall be kept free of unnecessary accumulation of combustible materials and the immediate vicinity of all buildings and open storage sites shall be kept clear of grass, weeds of any sort of rank vegetation.

**6.3** Paved or *pucca* roads of not less than 6 m width shall be provided within the compound to facilitate the passage of fire engines and particularly to give easy access to the static tanks.

**6.4** At least two gateways of 6 m width and minimum headroom of 5 m shall be provided for entry into the compound. In addition it is preferable to have one more exit of not less than 6.5 m width which may be used during emergency.

**6.5** The road giving access to static tank/reservoir shall also provide space for furning circle of fire fighting appliances and shall have a minimum width of 6 m.

**6.6** No part of the compound within the mill shall be utilized for salvaging burnt jute and also for drying loose jute/or bales unless it is separated by a clear space of 22.5 m.

**6.7** No jute or combustible material dump shall abutt the compound wall. Height of compound wall shall be at least 2 m more than the maximum height of any dump located within 8 m of the wall.

## 7 BUILDING CONSTRUCTION

**7.1** The constructional features of all the buildings within the compound shall comply with the requirements of IS 1641.

**7.2** Buildings housing spinning and process preparatory thereto, sack sewing and bitumen coating sections shall have a fire resistance of not less than that of a Type I structure as specified in IS 1641.

**7.3** All godowns and storage buildings shall also have a fire resistance of not less than that of Type I structure as specified in IS 1641.

**7.4** Buildings housing beaming, dressing, weaving and calendering processes shall have a fire resistance of not less than that of Type 2 structures as specified in IS 1641.

**7.5** Buildings housing electrical power generators, transformers and substations shall comply with provisions laid down in IS 3034.

**7.6** Buildings housing offices, engine house, pump houses and other utility services as also motor and rope alleys shall have fire resistance of not less than that of Type 3 structures as specified in IS 1641.

**7.7** Buildings housing manufacturing and processing sections shall be single storey structures unless the construction of the intermediate flooring and separation of horizontal and vertical opening comply with provisions for Type I structure as laid down in IS 1641.

**7.7.1** In no case shall such buildings be more than two storeys in height; nor shall the highest point of the roof be more than 15 m above ground level.

**7.8** Jute godowns as also finished goods godowns shall preferably be well ventilated single storey structures.

**7.9** The construction of godowns containing materials other than jute or jute goods shall comply with provisions laid down in IS 3594.

**7.10** The roofs of the jute godowns shall be provided with smoke ventilating hatches preferably of automatic type of the extent of  $1\text{m}^2$  per  $50\text{ m}^2$  of floor area. The size of the individual hatches shall be about  $2.5\text{ m}^2$ .

**7.11** No independent/individual jute godowns shall exceed  $500\text{ m}^2$  in floor area.

**7.12** Where the area of the godown exceeds the prescribed limit (see 7.11) the godown shall be subdivided by a separating wall from the floor to at least one metre above the ceiling/roof to make it fire resisting for 4 hours.

**7.13** No point within a godown shall be more than 20 m away from an external door or fire exit or an emergency exit. The floors of every godown shall be adequately sloped towards the external door to ensure proper drainage to avoid water logging during fire fighting operation.

**7.14** Every external wall of a jute godown shall be provided with one doorway of at least  $3 \times 2\text{ m}$  size per every 10 m of its length or part thereof, with a minimum of one doorway to each wall.

## 8 SEPARATING WALLS

**8.1** Separating walls complying with 6.1.2 of IS 1642 shall be provided to segregate the following sections of the mill from one another:

- a) Jute godowns;
- b) Finished goods godowns;
- c) Rooms for waste recovery plant;
- d) Rooms for baling of jute, jute cutting and waste;
- e) Rooms housing bitumen coating and polythene lining;
- f) Jute selecting and assorting room;
- g) The main mill and factory building housing softening, carding, roving, drawing, spinning, beaming, dressing, weaving, sack sewing and calendering machinery; and
- h) Rope and motor alleys.

**8.2** Separating walls complying with **6.1.2** of IS 1642 shall also be provided between the following godowns:

- a) Baled jute godowns;
- b) Loose jute godowns;
- c) Finished goods godowns;
- d) Jute waste (caddi) godowns,
- e) Oil godowns;
- f) Stores for non-hazardous goods; and
- g) Stores for hazardous goods.

**8.3** Separating walls complying with **6.1.2** of IS 1642 shall also be provided between the following sections:

- a) Pumps house,
- b) Boiler house,
- c) Transformer house, and
- d) Electrical generating station and sub-station.

## 9 DISTANCES

**9.1** A minimum distance of 15 m shall be maintained between jute and caddi godowns and manufacturing and processing sections of the mill.

**9.2** A minimum distance of 7.5 m shall be maintained between finished goods godown and other godowns and the manufacturing and processing sections of the mill, unless such godowns form a part of the mill block and segregated therefrom and other godown by separating walls.

**9.3** No building shall be within 7.5 m of the manufacturing and processing sections of the mill, unless it forms a part of the same block and is properly segregated therefrom by separating walls. Open spaces between the manufacturing/process buildings shall be connected to a road or yard of sufficient width to allow the fire appliance an easy access.

**9.4** Peels shall not be located within 30 m of a boiler house or bitumen melting furnace or other storage in the open and within 20 m of any other building.

## 10 MACHINERY AND PROCESSES

**10.1** Not more than two days requirement of jute shall be brought inside manufacturing and processing buildings.

**10.2** The flash point of the batching oil used shall not be less than 100°C.

**10.3** The batching oil tanks shall be located outside the mill building and the capacity of the tank shall not exceed the daily requirements.

**10.4** A clear space of at least 8 m be provided between the softening machines and the breaker cards.

**10.5** The cards shall be spaced at intervals of not less than 2 m from each other.

**10.6** The floor area occupied by machinery subsequent to carding and up to weaving be transversed by clear passageways of at least 3 m width at 50 m interval.

**10.7** Steam piping of the dressing and calendering machines shall be thoroughly lagged with incombustible insulation and the same maintained in proper order. It should not come in contact with any other flammable material.

**10.8** No combustible material shall be used in the construction of totally enclosed dressing machinery. These machinery shall also be provided with thermostatic controls so that steam supply would be automatically cut off at a predetermined safe temperature.

**10.9** A clear space of at least 6 m shall be provided between the weaving looms and calendering machines and between the calendering machines and the sack sewing machines.

**10.10** The twine carrying trays over the sewing machines should preferably be of incombustible construction and separate trays shall be provided for a group of machines not exceeding 6 in number.

**10.10.1** A minimum clear space of 1 m shall be provided between the trays and each group of machines.

**10.11** Not more than daily out-turn of finished goods shall be allowed to accumulate in the sack sewing, calendering and baling sections.

**10.12** The bitumen melters for the bitumen coating and paper or polythene lining machinery shall be located in the open outside the mill building. They shall further be segregated, therefrom, by a separating wall without any opening barring that required for passage of the pipe line for conveying the molten bitumen to the coating machinery.

**10.13** A stop valve shall be provided on the incoming molten bitumen pipe line in a position which would

remain accessible in case of a fire in the coating machine.

**10.14** The bitumen coating and the lining (paper or polythene) machines shall be bonded and electrically earthed.

**10.15** The capacity of the molten bitumen vat of the coating machine shall not exceed 50 litres.

## 11 STORAGE CONDITIONS

### 11.1 General

Storage of materials other than jute or finished goods shall comply with IS 3594.

### 11.2 Jute Godowns

**11.2.1** No baled jute godown shall contain more than 4 000 quintals of jute.

**11.2.2** No loose jute godown shall contain more than 1 000 quintals of jute.

**11.2.3** Jute bales shall be piled so that the stacks lean slightly away from the aisles separating individual stacks. Bales shall be placed as close to each other as possible so that no air passage or pockets are formed within a stack.

**11.2.4** Jute bales shall not be stacked directly on godown floor but on wooden sleepers or masonry or concrete plinths of at least 22.5 cm in height.

**11.2.5** No stack of jute bales shall have its length or breadth more than 15 m.

**11.2.6** The maximum height for stacks of *pucca* bales of jute shall not be more than 6 m while that for stacks of *kutcha* bales shall not be more than 5 m. In no case shall the clearance between the roof (or sprinkler head in case of sprinkler protected building) and the top of the stacks be less than 2 m.

**11.2.7** Every stack of jute bales shall be separated from its neighbouring stack by longitudinal and cross aisles.

**11.2.8** *Pucca* bales shall not be stacked within 1 m or godown walls or within 0.5 m of supporting columns or pillars.

**11.2.9** No jute bales shall be stacked within 2 m of doorways of the godown.

**11.2.10** Every stack of jute shall be so arranged that a clear 2 m passage is kept from doorway to the end of opposite wall terminating to another doorway at not more than 20 m.

**11.2.11** As far as possible no loose jute/bales shall be kept outside the godown after the daily closure of godown or mill.

**11.2.12** As far as possible no vehicle loaded with jute/

jute bales shall be parked on any passage or paved road approaching any godown or between godown and approaches to the static water tank/reservoir.

**11.2.13** Every godown containing jute/jute bales shall provide a board on the doorway of the godown stating the number of jute bales and total quantity of jute stored.

### 11.3 Finished Goods Godowns

**11.3.1** Not more than 20 000 quintals of finished goods shall be stored in any one godown.

**11.3.2** The height of stacks shall not exceed 8 m.

### 11.4 Caddi Godown

Stacking of bales of caddi shall comply with provisions laid down for jute bales.

### 11.5 Jute Peels

**11.5.1** No jute peel shall be put up within 20 m of any building nor within 30 m of a boiler house or a bitumen melter in the open.

**11.5.2** No jute peel shall contain more than 15 000 quintals of jute, nor shall it be more than 6 m in height.

**11.5.3** A minimum clear space of at least 25 m shall be provided between any two jute peels.

**11.5.4** The peels shall be put up over cemented platforms and shall be surrounded by a fencing so that no unauthorized person may gain access to the same.

## 12 ELECTRICAL INSTALLATION

### 12.1 General

**12.1.1** The electrical installation shall conform to IS1646.

**12.1.2** All motors shall be of the totally enclosed type (except in wet locations where they shall be of drip proof type) and conform in all other respects, to the relevant Indian Standards for textile motors.

**12.1.3** All equipment shall be of metal clad construction, dust tight and of adequate capacity.

**12.1.4** Lamp fittings within the manufacturing and process areas shall be of dust-tight type and the wiring including the lead to the fitting shall be enclosed in steel conduits.

### 12.2 Jute Godown Lighting

**12.2.1** The supply of electricity shall be at low voltage, that is, not exceeding 250 V.

**12.2.2** All wiring shall be enclosed in a heavy gauge screwed steel conduits or shall be of mineral insulated

copper or aluminium sheathed cables with or without PVC sleeving.

**12.2.3** The conduit shall be affixed to (not recessed into) the external side of the walls of the godowns excepting the lengths required to carry the cables to the light fittings. The latter portions of conduit run shall be at least 1 m above highest stacking level and shall be of minimum length required for this purpose.

**12.2.4** No jointing of cable inside the godown shall be permitted.

**12.2.5** Only bulkhead lighting fittings shall be installed inside the godown. The glass cover of the fitting shall be protected by steel wire guards.

**12.2.6** Each lighting fitting shall be fixed to the wall or roof not more than 45 cm below roof of godown. In no case shall the fittings be installed below the level of the sprinkler heads nor shall there be a clearance off less than 1 m between the fitting and the top of the highest stack.

**12.2.7** The controlling switch(es) of the lighting system and all fuses or cut-out shall be situated outside the godown in a convenient place and effectively protected from weather.

**12.2.8** A pilot lamp controlled by the switch(es) shall be provided on the switch panel to indicate whether the lights inside the godowns are on or off when the godown is closed and locked.

**12.2.9** The control switch(es) shall be provided with locking arrangement to prevent unauthorized use.

**12.2.10** All perimeter, street and year lighting shall be on separate electric circuit independent of building light circuit and shall be provided with separate switches and main switches.

### **12.3 Finished Goods, Godowns Lighting**

The wiring shall be enclosed in screwed steel conduits or shall be of mineral insulated copper or aluminium sheathed cable with or without PVC sleeving and fittings shall be of bulkhead type fitted directly on the roof.

**12.3.1** The circuit(s) shall be controlled by a linked switch and cut-out which shall be placed outside the godown in a convenient position.

## **13 FIRE PROTECTION ARRANGEMENTS**

**13.1** Jute being a highly combustible material its spinning, weaving, and other manufacturing process and storage in large quantities is of considerable fire risk. To guard against this risk suitable fire prevention, first aid fire fighting and major fire fighting arrangement shall be provided.

**13.2** The extent of the protection arrangements to be provided will depend on various factors like size of the factory, risk involved, availability of outside help for major fire fighting and so on. However, all factories irrespective of their size shall employ at least one whole time supervisory officer assisted by a few firemen to look after the day to day fire prevention and first air fire fighting arrangements.

**13.3** Adequate fire prevention measures in consultation with local fire authority shall be laid down for all fire risk areas and these measure checked at least once every month. Any irregularities observed shall be brought to the notice of the top management and remedial action taken immediately.

**13.4** Fire fire aid fire fighting appliances of appropriate type and size as specified in IS 2190 shall be provided in all parts of the factory.

**13.5** First aid fire appliances shall be properly maintained, checked, tested and refilled as specified in IS 2190 and proper records maintained.

**13.6** All workers shall be periodically trained in observing the fire prevention measures and proper use of first aid fire appliances provided near their place of work. They shall be made fire conscious by repeated lectures, demonstrations, display of posters and other methods. 'No Smoking' boards shall be displayed at regular intervals throughout the premises.

**13.7** Clearly audible fire alarm shall be provided in all areas of the factory to alert the workers so that they can evacuate themselves and also engage in fire fighting operations immediately.

**13.8** For high fire risk processes and storage areas specially those which remain unattended for considerable period an automatic detection and alarm system or an automatic sprinkler system shall be installed. These systems shall be connected to a Central Control Room. All other risk areas shall be periodically visited for fire watching. Suitable communication systems from different areas to a Central Control Room operable both during working and non-working hours shall be provided.

**13.9** All factories irrespective of their size and risk shall make suitable provision for water supplies for fire fighting. The requirement of water will vary according to the size and risk. However, generally the minimum requirement for water for a medium size factory will be 1 800 l/min for process area and 3 600 l/min for storage areas. The total provision of water always available shall be for four hours at the above rates. In case there is replenishment of water, the total provision for water may be reduced to 2 hours at the above rates.

**13.10** Arrangements for water supplies for fire fighting shall be in form of fire hydrants and static water tanks. At least one half of the total requirements shall be in the form of static water tanks and these shall be located at a distance not exceeding 180 m from the buildings/risks to be protected.

**13.11** Factories which are located within 8 km of well equipped Public or Local Municipal Fire Brigade may depend on such fire brigade for major fire fighting arrangements. However, such mills shall make arrangements for training of the workers in the use of the hydrant system under the guidance of the fire staff to contain the fires till the assisting Local Fire Brigade arrives.

**13.12** Factories which are located at a distance exceeding 8 km from the nearest well equipped local fire brigade shall make their own arrangements for major fire fighting. The requirements of major fire appliances water supplies for fire fighting, fire station buildings, fire fighting staff and their duty system shall be planned and worked out in consultation with the local fire authority.

**13.13** Where main reliance for major fire fighting is placed on the assisting local fire brigade close liaison shall always be maintained and periodical fire practices shall be held to ensure prompt attendance.

**13.14** Suitable arrangements shall be made for expeditious communication of fire messages between the mill and the assisting local Fire Brigades. This system shall be checked at the change of each shift and alternative arrangements made in case of any failure.

**13.15** Notices in regional language, Hindi and English shall be displayed in prominent places of the mill indicating the action to be taken in case of an outbreak of fire.

**13.16** An emergency fire fighting and rescue procedure shall be worked out, regularly practiced and periodically revised when necessary.

#### 14 ILLUMINATION

**14.1** For effective fire fighting purposes the minimum illumination of various sections of the premises shall be as indicated below:

	Lux
Weaving, spinning, flat, jacquard carpet looms and cop winding	200
Yarn, calendering	150
Open compound	20

#### 15 GENERAL SAFETY PROVISIONS

**15.1** No smoking or cooking shall be carried out in the premises except in building specially set apart for such purposes.

**15.2** No welding or metal cutting operations, removal of paint by burning or work with open fires shall be carried out within 15 m of godowns or open storage sites.

**15.3** No welding or metal cutting operations, or work with open fires shall ordinarily be permitted within manufacturing or process blocks. If such work is essential it shall be carried out after obtaining clearance from the Officer-in-Charge of the section concerned, and in consultation with the safety/fire officer of the mill. During such operation all necessary precautions shall be taken and skeleton fire staff with first-aid fire fighting appliances detailed for standby duties.

**15.4** Locomotives, cranes, road rollers, etc, using coal or wood as fuel shall not be permitted inside the factory without proper spark arrestors. Diesel locomotives may however be used.

**15.5** The design and use of all types of goods handling appliances shall comply with relevant provisions laid down in IS 3594.

**15.6** All godowns and manufacturing and process areas shall be swept clean of waste materials at the end of the day's work. In case of mills working round-the-clock, the sweeping operations shall be carried out at the end of each shift.

**15.7** Doors and windows of all buildings shall be kept locked when no work is being carried out therein.

**15.8** Every person shall be searched for matches or smoking materials before being permitted inside jute godowns.

**15.9** Jute godowns shall be closed and locked immediately after completion of every stacking or issuing operation. Before such closure, however, the godown shall be thoroughly inspected by mills security staff.

**ANNEX A***(Clause 2)***LIST OF REFERRED INDIAN STANDARDS**

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
232 : 1985	Glossary of textile terms — Natural fibres ( <i>second revision</i> )		— Code of practice ( <i>second revision</i> )
1641 : 1988	Code of practice for fire safety of buildings: General principles of fire grading and classification ( <i>first revision</i> )	3034 : 1993	Fire safety of industrial buildings: Electrical generating and distributing station — Code of practice ( <i>second revision</i> )
1642 : 1989	Code of practice for fire safety of buildings: General: Details of construction ( <i>first revision</i> )	3594 : 1991	Code of practice for fire safety of industrial buildings: General storage and warehousing including cold storages ( <i>first revision</i> )
2190 : 1992	Selection, installation and maintenance of first aid fire extinguishers	8757 : 1978	Glossary of terms associated with fire safety

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### Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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### Amendments Issued Since Publication

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